

# Overview of M&V Team and Existing Tools

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# Overview of M&V Team:

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- This is the 6<sup>th</sup> Federal M&V Summit since October 2001
- Participants include DOE, DOD, federal agencies, ESCO partners, others involved with Federal ESPCs
- Currently 5 active working groups:
  - Commissioning WG
  - M&V Plan & Reporting Integration WG
  - Advanced Metering WG
  - O&M Reporting WG
  - Performance Period Administration WG

# 6 working groups have completed their deliverables:

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- M&V Planning WG
  - *M&V Planning Tool*
- M&V Training WG
  - M&V course
- Retro-Commissioning WG
  - *Introduction to Including Retro-Commissioning in Federal Energy Saving Performance Contracts*
  - *Example Retro-Commissioning Scope of Work To Include Services as Part of Super ESPC Detailed Energy Survey*
- Annual Reporting WG
  - *Annual Report Outline*
- M&V Plan Outline WG
  - *M&V plan Outline*
  - *Post-installation Report Outline*
- Project Documentation WG
  - *Draft project Documentation Structure*

# Federal M&V Team Resources:

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M&V Team keeps tools & materials in 2 locations:

1) Federal M&V Team website:

<http://www.dc.lbl.gov/mv/>

2) LBNL's A-Team website:

<http://ateam.lbl.gov/mv/>

# Federal M&V Team website

<http://www.dc.lbl.gov/mv/>

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Web site is kept updated with:

- Contact information for all participants
- Working Group Information:
  - Active and completed WGs
  - WG status reports, goals, deliverables, participants, meeting minutes, interim / final WG deliverables
- Information on M&V Summits
- “Products” page links to LBNL A-Team site

# LBNL's A-Team website:

<http://ateam.lbl.gov/mv/>

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“Applications Team” (A-Team) Measurement & Verification Documents (see printout of website):

- Key M&V Documents
  - M&V guidelines, training curriculum, finished WG products
- Draft M&V Documents
  - Draft products
- Background Documents
  - Related items on topics such as commissioning, baselines, stipulations
- Links
  - FEMP Super ESPC home page, Defense Energy Support Center, and Dept. of Navy Performance Contracting

# Measurement & Verification Documents

[Key Documents](#)
[Draft Documents](#)
[Background Documents](#)
[Links](#)
[IPMVP](#)

The following resources will help organizations implement an M&V program. The materials range from implementation guidelines to checklists and other resources. For more information, view the [FEMP Super ESPC Homepage](#).

## Key M&V Documents

[FEMP M & V Guide](#)  
[Version 2.2](#)  
*August 2000*

This document provides guidelines and methods for measuring and verifying energy and cost savings associated with Federal agency performance contracts.  
(PDF 2.47 MB, 340 pages)

[Detailed Guidelines for  
FEMP M&V Option A](#)  
*May 29, 2002 (.doc)*

A detailed guide to applying Option A M&V protocols.

[Option A Detailed  
Guidelines](#)  
*May 29, 2002 (.pdf)*

Same file as above in PDF format.

[M&V Resources and  
Training Opportunities](#)  
*Revision 5*  
*June 16, 2003*

This frequently updated web page provides an extensive collection of resources, describing tools indicative of those available to help users apply M&V protocols. Resources detailed include current M&V training classes, guidelines from utility, state, and national organizations, case studies, equipment such as data loggers, as well as software tools.

[FEMP 1/2 Day M&V  
Training Course](#)  
*July 23, 2003*

These Powerpoint™ presentations are used during a half-day measurement and verification training course which is now offered in conjunction with the FEMP ESPC Delivery Order Workshops.

[Complete Set](#)  
*(584 KB .zip file)*

[Part 1](#)  
*(69 KB .ppt file)*

[Part 2](#)  
*(390 KB .ppt file)*

[Part 3](#)  
*(436 KB .ppt file)*

[Part 4](#)  
*(121 KB .ppt file)*

<a href="#"><u>Responsibility Matrix</u></a> <a href="#"><u>Version included in IDIQ (.doc)</u></a>	This two-page summary describes typical financial and operational responsibilities (e.g., energy costs, operating hours) and their impacts on ESPC contracts. There are two blank columns to be filled in by the user.
<a href="#"><u>Responsibility Matrix</u></a> <a href="#"><u>Version included in IDIQ (.pdf)</u></a>	Same file as above in PDF format.
<a href="#"><u>Annual Report Outline</u></a> <a href="#"><u>May 19,2003 (.doc)</u></a>	This outline details a comprehensive reporting format for annual measurement & verification (M&V) reports for ESPC projects. In addition to providing place holders for M&V activities, this outline includes reporting on verification of performance, operations, and maintenance activities.
<a href="#"><u>M&amp;V Review Checklist</u></a> <a href="#"><u>January 2004</u></a>	Use these checklists to help ensure adequate content of M&V plans, Post-Installation Reports, and Annual Reports.
<a href="#"><u>M&amp;V Planning Tool</u></a> <a href="#"><u>June 17, 2003</u></a>	The goal of the M&V Planning Tool is to provide a framework that will help in the development of a technically rigorous M&V plan. The Tool helps by identifying M&V specific issues at an early stage of project development and by assessing risks and the cost implications of different approaches. M&V Planning Tool is provided as one zipped file which contains one Word file (to be read first) and two Powerpoint files.
<a href="#"><u>Introduction to M&amp;V for Super ESPC Projects</u></a>	This document provides an overview of why and how M&V is conducted in Super ESPC projects. Topics include allocating project risk using M&V, overview of steps to verify savings, and key M&V submittals encountered in Super ESPC projects.

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Draft M & V Documents	
<a href="#"><u>Draft Renewable Energy Guide</u></a> <a href="#"><u>October 2000</u></a>	Proposed revision to Chapter 35 Renewable Energy Technologies, of the FEMP Measurement and Verification Guidelines for Federal Energy Projects. Alternatively, this may be published as a separate guide.
<a href="#"><u>Draft M&amp;V Plan Outline</u></a>	Under development by a working group of the Federal M&V Team, this draft template for an M&V plan is being developed for use on all Federal ESPC projects.
<a href="#"><u>Draft Post-Installation M&amp;V Report Outline</u></a>	This template covers installation verification and has been developed by the Federal M&V Team for use on Federal ESPC projects.
<a href="#"><u>Including Retro-Commissioning in Federal Energy Saving Performance Contracts</u></a>	Prepared by the FEMP M&V Team, the first document provides an overview of including retro-commissioning with a performance contract.
<a href="#"><u>Example Retro-Commissioning Scope of Work</u></a>	This document is a step-by-step scope of work which can be used to incorporate retro-commissioning services into a Super ESPC project.

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Background Documents



<a href="#"><u>Continuous Commissioning Guidebook</u></a>	Continuous Commissioning Guidebook for Federal Energy Managers provides specific details on optimizing commercial building systems through metering various types of systems, setting performance benchmarks, and calculating energy savings. This guide was developed for FEMP by Texas A&M and is dated October 2002.
<a href="#"><u>M &amp; V for Operations and Maintenance Technical Note</u></a> <i>April 27, 1998</i>	This four-page technical note summarizes issues associated with implementing M&V protocols on operations and maintenance improvements.
<a href="#"><u>Background Paper on M&amp;V for O&amp;M</u></a>	This document identifies issues and approaches for measuring and verifying (M&V) savings associated with improvements in operations and maintenance (O&M) of commercial and institutional buildings.
<a href="#"><u>Application of FEMP M&amp;V Guidelines on Super ESPC Projects: Observations and Recommendations</u></a> <i>May 2000</i>  <a href="#"><u>Technical Appendix</u></a>	This report describes 7 Super ESPC projects in the Western Region, noting common practices and including 11 recommendations for improving M & V planning and implementation.
<a href="#"><u>DOE ESPC Procedures and Methods</u></a>	Excerpts from the Energy Policy Act of 1992 related to ESPC and M&V, 10 CFR Part 436.
<a href="#"><u>Advanced Utility Metering</u></a>	Overview of options in metering technology, system architecture, implementation & relative costs. <i>(published by NREL in 2002)</i>
<a href="#"><u>Baseline Adjustments</u></a>	Issue paper on Baseline Adjustments (1993)
<a href="#"><u>M &amp; V Team Charge</u></a> <i>January 2004</i>	Describes the FEMP National M&V Team, its members, goals and expectations
<a href="#"><u>M&amp;V Value Tool Specifications</u></a> <i>May 19, 2001</i>  <a href="#"><u>Spreadsheet of Example Projects</u></a>	<p>This file contains functional specifications for an alpha version of a tool that helps users calculate energy savings, savings uncertainty, and M&amp;V costs for energy end-use equipment projects. It is a planning tool to develop and compare different M&amp;V activities based on uncertainty and cost, and help the user either select the most cost-effective M&amp;V plan for their project, or apply limited resources where they will be most effective.</p> <p>The spreadsheet contains two example projects that use the methodology contained in the specifications, and are provided for developers to check the Tool's output.</p>
<a href="#"><u>M&amp;V Case Study</u></a> <i>November 2001</i>	M&V Case Study Power Point Presentation

<a href="#"><u>Practical Guide for Commissioning Existing Buildings</u></a>	A guide of almost 150 pages prepared by the staff of Portland Energy Conservation, Inc. and Oak Ridge National Laboratory that covers the benefits and how-to's of retro-commissioning projects. Individual guide sections are available in WordPerfect 6/7/8/9 file format (use the link, left).
<a href="#"><u>Practical Guide for Commissioning Existing Buildings</u></a>	This link downloads the entire retro-commissioning guide in PDF format, 380 KB.
<a href="#"><u>Commissioning In Energy Performance Contracts</u></a> <i>April 2000</i>	This paper investigates issues related to Energy Savings Performance Contracts (PCs). It provides specific guidance on how to incorporate and integrate commissioning into various types of PC contracts and for various types of buildings and equipment. The information in this paper can assist both owners and contractors in planning and conducting appropriate and efficient commissioning in their PC projects.
<a href="#"><u>Proper Use of Stipulations in M&amp;V</u></a>	This FEMP Focus article provides an overview of the proper use of Option A M&V methods, as detailed in <i>Detailed Guidelines for FEMP M&amp;V Option A</i> .

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Links	
<a href="#"><u>Air Force ESPC</u></a>	Air Force Civil Engineering Support Agency - Energy Savings Performance Contracts - Details contract vehicles, training and publications available.
<a href="#"><u>Army ESPC</u></a>	Guidance and tools on Energy Savings Performance Contracting from Facilities and Housing Directorate - Utilities and US Army Engineering and Support Center, Huntsville.
<a href="#"><u>Defense Energy Support</u></a>	General Information on ESPC and support services through Defense Energy Support - Energy Conservation Branch.
<a href="#"><u>International Performance Measurement and Verification Protocol (IPMVP)</u></a>	An informational site providing an overview of current M&V best practices available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. The web site contains information about MVP, why is M&V important, who develops and sponsors it, and provides links for downloading electronic copies of the protocol or requesting hard copies of the MVP.
<a href="#"><u>Commissioning and O&amp;M Resources</u></a>	Portland Energy Conservation Inc.'s page for Commissioning and O&M Resources. The page contains links to documents and organizations related to building commissioning and operation and maintenance.
<a href="#"><u>FEMP Super ESPC homepage</u></a>	FEMP's home page for ESPCs. Includes links to tools, guides, and contracts.
<a href="#"><u>Navy/Marines ESPC</u></a>	Dept. of the Navy - Navy energy saving performance contracting site provides details on available contract vehicles, training, and publications.
<a href="#"><u>M&amp;V Instructional Tool</u></a>	The Monitoring and Verification (M&V) Instructional Tool was developed by Pacific Northwest National Lab (PNNL) to provide basic information on M&V with the ability to drill down to get more detail. The tool is presented in a Windows Help format as a compiled help file (CHM), like help files in Microsoft Windows.

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